



# Gravity

## OVERVIEW

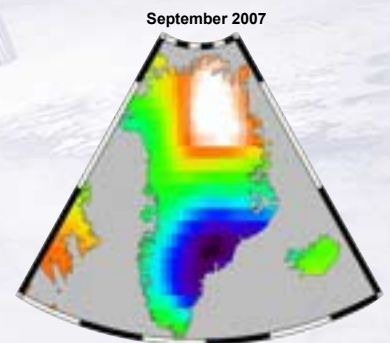
NASA launched the Gravity Recovery and Climate Experiment (GRACE) in 2002 to obtain high-resolution, global measurements of Earth's gravity field from space. After more than six years, GRACE continues to reveal increasingly subtle changes in Earth's gravity field. These gravity variations reflect changes in Earth's mass, such as those caused by changes in ice mass in Greenland and Antarctica, variations in the water content of river basins on land, or changes caused by large earthquakes. GRACE data are substantially improving our knowledge of important aspects of global change including the climate consequences of a warming world.

As GRACE's twin satellites pass over features on Earth, the distance between the satellites changes ever so slightly as the mass below them varies. Extremely sensitive instruments on GRACE can measure these changes to an accuracy of 1 micrometer (one-millionth of a meter), which is 20 to 100 times smaller than the width of a human hair. As GRACE orbits,



it provides data for scientists to construct a new map of Earth's gravity field every month.

GRACE is a collaborative endeavor involving the Center for Space Research at the University of Texas, Austin; NASA's Jet Propulsion Laboratory, Pasadena, Calif.; the German Space Agency; and Germany's National Research Center for Geosciences, Potsdam.



## FACTS

- GRACE provides highly accurate maps of variations in Earth's gravity field on a monthly basis.
- Flies its two identical spacecraft about 220 kilometers apart in a polar orbit 500 kilometers above Earth.
- Provides data to study gravity changes due to surface and deep currents in the ocean; runoff and ground water storage on land masses; exchanges between ice sheets or glaciers and the oceans; and variations of mass within Earth.
- Improves our ability to predict, plan for, and respond to extreme events such as floods and drought.
- Improves our understanding of sea level change to help determine how much is from thermal expansion of the ocean and how much is due to ice melt resulting from global warming.
- Helps track deep ocean currents from space and their impact on global climate.
- Conducts a secondary experiment, called atmospheric limb sounding, to examine how the atmosphere affects signals from the Global Positioning System (GPS) satellites.

